UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/564,969 | 08/25/2006 | Paul R. Drury | 27754/26717 | 5387 |

4743 7590 10/28/2009

MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 SEARS TOWER
CHICAGO, IL 60606-6357

| EXAMINER | |
|---|---|
| ANGWIN, DAVID PATRICK | |
| **ART UNIT** | **PAPER NUMBER** |
| 3729 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 10/28/2009 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/564,969 | DRURY, PAUL R. | |
| | Examiner | Art Unit | |
| | DAVID P. ANGWIN | 3729 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *02 July 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) *12-17 and 20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11, 18-19, and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### ***Claim Rejections – 35 USC § 103***

The following is a quotation of 35 U.S.C. § 103(a) that forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically taught or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 1-9, 11, 18, and 21** are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Gardner* (US Patent 4,246,076) in view of *Nakazawa et al* (JP Patent Publication H06-206314).

a. *Gardner* discloses in his reference the following:

i. forming a body (Figs. 1-3, items 11 and 21) of a first material said body having a periphery (Figs. 1-3, *outline of items 11 and 21*);

ii. forming a plate (Fig. 1d, item 23) of a second material (2:49-50) around said body such that the plate extends around at least a portion of said periphery of said body;

iii. the plate is electroformed (2:49-50);

iv. said first material is formed as a layer on a substrate said layer being processed to form a plurality of bodies (Figs. 1-3, items 11 and 21; 3:20);

v. said plurality of bodies are arranged in an array corresponding with the desired array of nozzles in completed nozzle plates;

vi. the first material is a plastics material (Figs. 1-3; 1:67-2:2);

vii. the second material is a metal (Figs. 1-3; 2:49-50);

viii. said first material is a photoresist (2:11-36);

ix. defining a plurality of distinct bodies of polymeric material distributed over the nozzle plate plane and forming at least one metal nozzle plate layer by electroforming around said bodies of polymeric material (Figs. 1-3);

x. forming a layer of first photoresist material (Figs. 1-3, item 3) on a substrate (Figs. 1-3, item 1);

xi. selectively exposing and removing photoresist material to define on the substrate an array of distinct bodies of said first material (Figs. 1-3; 3:20);

xii. forming a first plate of metal (Figs. 1-3, item 23) around said bodies, so as to form a metal nozzle plate having apertures, each aperture containing a body (Figs. 1-3, items 11 and 21) of said first material; and

xiii. the first material is a negative photoresist (Figs. 1-3).

b. Regarding claim 1 and 18, in addition to the above limitations, *Gardner* may not expressly disclose forming a nozzle extending through the body.

i. However, *Nakazawa et al* teaches forming a nozzle extending through a body (Figs. 1 and 7-10). The advantage of forming a nozzle extending through a body is to produce a nozzle with less vibration during operation. Therefore, it would have been obvious to form a nozzle extending through a body to produce a nozzle with less vibration during operation.

c. Regarding claim 5, in addition to the limitations in claim 3, *Gardner* may not expressly disclose masking said layer, exposing said layer to radiation and removing portions of said layer.

i. However, *Nakazawa et al* further teaches masking a layer, exposing the layer to radiation, and removing portions of the layer (Figs. 1 and 7-10). The advantage of masking a layer, exposing the layer to radiation, and removing portions of the layer is to form nozzle holes. Therefore, it would have been obvious to mask a layer, expose the layer to radiation, and remove portions of the layer to form nozzle holes.

d. Regarding claim 6, in addition to the limitations in claim 1, *Gardner* may not expressly disclose forming the nozzle by ablating through the body.

i. However, *Nakazawa et al* further teaches forming a nozzle by ablating through a body (Figs. 1 and 7-10). The advantage of forming a nozzle by ablating through a body is to form nozzle holes. Therefore, it would have been obvious to form the nozzle by ablating through the body to form nozzle holes.

**Claim 10** is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Gardner* (US Patent 4,246,076) in view of *Nakazawa et al* (JP Patent Publication H06-206314) and further in view of *Truninger et al* (US Patent 6,204,182).

a. Regarding claim 10, *Gardner* as modified may not expressly disclose discloses in his reference attaching a nozzle plate to a droplet deposition apparatus before the nozzle is formed.

i. However, *Truninger et al* teaches in her reference attaching a nozzle plate to a droplet deposition apparatus before the nozzles are formed (Figs. 2A-F). The advantage of attaching a nozzle plate to a droplet deposition apparatus before the nozzles are formed is to make an in-situ nozzle plate. Therefore, it would have been obvious to attach a nozzle plate to a droplet deposition apparatus before the nozzles are formed to make an in-situ nozzle plate.

**Claim 19** is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Gardner* (US Patent 4,246,076) in view of *Nakazawa et al* (JP Patent Publication H06-206314) and further in view of *Chung et al* (US Patent 7,240,433).

a. Regarding claim 19, *Gardner* as modified may not expressly disclose discloses in his reference depositing a metallic seed layer on the substrate prior to forming the layer of first photoresist material.

i. However, *Chung et al* teaches in his reference depositing a metallic seed layer (Fig. 1H, item 46) on the substrate prior to forming the layer of a photoresist material (Fig. 1I, item 50). The advantage of depositing a metallic seed layer on the substrate prior to forming the layer of first photoresist material is to properly electroform the nozzle plate. Therefore, it would have been obvious to deposit a metallic seed layer on the substrate prior to forming the layer of first photoresist material to properly electroform the nozzle plate.

## ***Response to Arguments***

Applicant's arguments filed 7/2/09 have been fully considered but they are not persuasive.

First, the applicant argues that "to leave these posts in place would contradict the teaching of Gardner, as the posts would no longer perform their function as a mold for the shape of the finished nozzle" (applicant's arguments, 8:18-20). However, the examiner disagrees. It seems obvious and intuitive to the examiner that the posts in *Gardner* (Figs. 1a-3, items 11 and 21) could be exposed with radiation in the manner taught in *Nakazawa et al* (Figs. 1 and 7-10) – leaving the middle portions of the posts unexposed – allowing the nozzle post to still function as a mold (as disclosed by *Gardner*) but also allowing the middle portion of the post to function as a nozzle hole (as taught by *Nakazawa et al*). These references in combination disclose the claimed limitations. Therefore, the examiner maintains the rejection.

Second, the applicant argues that “the manner in which the nozzle is formed in Nakazawa is not technically compatible with Gardner" (applicant's arguments, 8:21-22). However, the examiner notes that one skilled in the art would know how to combine the concepts of the mold (*Gardner*) and the nozzle hole in the middle (*Nakazawa et al*) without any serious technical barrier to produce a final combined product. It's unclear to the examiner why, at *Gardner* (Fig. 1b), the exposure of the post cannot be partially blocked with a mask as shown in *Nakazawa et al* (Fig.10), with the developing being performed after the exposure to reveal the shape of the post structure that serves as a mold. Or, even more obvious, is making the nozzle by following the complete

procedure according to *Gardner*, then completing the nozzle with the hole by following the procedure according to *Nakazawa et al*. Therefore, the examiner maintains the rejection.

Third, the applicant argues that "the Office action has not provided reasons for rejection [of claim 11]" (applicant's arguments, 10:13-15). However, the examiner notes that the action clearly explains the limitations that are contained in claim 11 and how they relate to the other claims. Further, the interpretation of claim 11 does not substantially vary from the interpretation of the other claims – hence it has not been considered a separate species. If the applicant disagrees with the examiner, and claim 11 is substantially different from the others, the applicant and the examiner can agree to remove claim 11 as a separate species or the examiner can unilaterally impose an additional election of species. In any event, the examiner maintains the rejection.

## ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David P. Angwin, whose telephone number is (571) 270-3735. The examiner can normally be reached on 7:30 AM - 5 PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bryant, can be reached on 571-272-4526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. Dexter Tugbang/
Primary Examiner
Art Unit 3729

DPA
October 23, 2009